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ABSTRACT

Group investigation is an organizational approach that allows a class to work actively and collaboratively in small groups and enables students to take an active role in determining their own learning goals and processes. As part of reform and restructuring efforts, Beaverton High School (Oregon) implemented the Group Investigation model with sophomores, in 1990-1991, in a 6-week unit on the Gulf War. This unit was taught by four English and four social studies teachers in seven classes. The unit had six stages: organization of research groups, planning the investigation, student investigation and research papers, preparing the report by study teams, the final presentation, and testing and evaluation. After this initial experience with group investigation, the faculty made such a unit a standard part of the sophomore interdisciplinary curriculum. The Group Investigation method was modified over time until, in January 1994, the most ambitious teaching configuration was tried: biology, English, and government teachers offered a 3-course block. Both students and teachers rated the unit positively. The significant difficulty with this unit had to do with the school's science program which was tracked into biology (low) and chemistry (high) strands. The resulting lack of heterogeneity meant that students often lacked role models for behavior, academic achievement, and leadership. Reflection on past experience led the faculty to continue use of group investigation as an organizational principle and to use problem-based learning as a tool to focus selection of topics, structure a richer learning situation, and refine assessment methods. A key finding was the congruence between the social organization of the classroom and the governance of the school. (LL)

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GROUP INVESTIGATION: STRUCTURING AN INQUIRY-BASED CURRICULUM

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

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INTRODUCTION

Our reform and restructuring efforts at Beaverton High School in Beaverton, Oregon have centered on the classroom. The goal we established eight years ago as part of an continuing effort at school improvement was ordinary enough: to ensure success for all students. Our key outcome was selected for simplicity as well as significance: reducing the percentages of D and F grades.

Since then, we have followed an long-range plan for deep and lasting change, beginning with examining our theory and beliefs about education, moving to acquiring a broader repertoire of models of teaching, and, finally, adapting curriculum, materials, and organizational structures to match our evolving needs. One element currently important in this plan is a complex cooperative learning model known as Group Investigation (Y. Sharan & S. Sharan, 1992). This method was originally proposed by Thelen (1960) as an attempt "to combine in one teaching strategy the form and dynamics of the democratic process and the process of academic inquiry"(Joyce & Weil, 1986, p.227). Y. Sharan & S. Sharan (1976), with Hertz-Lazarowitz (1980), refined the method into its present form (1992), and describe its as follows:

> In Group Investigation, students take an active part in planning what they will study and how. They form cooperative groups according to common interest in a topic. All group members help plan how to research their topic. Then they divide the work among themselves, and each group member carries out his or her part of the investigation. Finally, the group

synthesizes and summarizes its work and presents these findings to the class. (1990, p.17)

Group Investigation provides a simple yet powerful structure for organizing a class to work actively and collaboratively in small groups. It allows students to take an active role in determining their own learning goals and processes, which appeals to their intrinsic motivation to learn. It allows for a high level of interaction in small groups while providing the structure to keep discussions focused and intellectually challenging. This lesson design can be used for a simple lesson taking only a few days or for a complex unit of many weeks.

From the beginning of our reform efforts, we believed that significant change would be broad and ongoing, and that we could not rely on any single innovation to achieve success for all students. We believed that real change would begin with beliefs, and that changes in books and technology, time schedules, and curriculum design should respond to the needs of new beliefs and practices.

It was also obvious that meaningful educational change meant changing what happens in classrooms. We studied educational theory and research, and we learned a variety of models of teaching. We experimented with integrating the disciplines and teaching in teams. We wanted students actively involved in their learning, working with a team of teachers. Group Investigation provided a teaching model ideally adapted to our evolving beliefs about teaching and learning. It limits lecturing, capitalizes on the best of cooperative learning practices, empowers students with choices about what and how to learn, almost demands integrated studies, and is easiest taught with teams of teachers. Teams

can share the extra burden of developing materials and lessons in response to the changing needs and interests of students as they investigate units of their own design. Teams also are better able to respond to the demands of a curriculum which changes every time it is taught – and hence can never become a rehash of old files and lecture notes.

Convinced of the potential worth of this teaching model, we learned how to implement Group Investigation, being fortunate enough to have Shlomo Sharan meet briefly with us in 1989. Our first major unit for our interdisciplinary sophomore English and Government classes was planned in the summer of 1990, focused on the tensions in the Middle East. We have now had several experiences with team-planned, integrated Group Investigation units. While we have had encouraging success with this methodology in our interdisciplinary sophomore course, we have also had some disappointments. These experiences have led to planned modifications for the 1994-1995 school year.

The purpose of this paper is to describe the results of our four years of experience with Group Investigation in an evolving interdisciplinary Core program for high school students. I will describe our initial experience in some detail as a means both of explaining the mechanics of the methodology and of illustrating some of the issues faced in adopting this method in a team-designed curriculum. I will then explain more briefly how we modified our use of Group Investigation in the following years, with special emphasis on the results, both positive and negative, of our most recent experience. Our assessment of this last experience led us to identify some key areas needing additional revision. The conclusion explains why we feel that a marriage of the classroom orga-ization of

Group Investigation with the problem definition of Problem-Based Learning (Stepien, 1993) offers the most powerful methodology we know for structuring an inquiry-based curriculum.

WAR IN THE MIDDLE EAST: AN INQUIRY-BASED CURRICULUM

What did suburban sophomores in Oregon know about resolving conflict in the Middle East? More than many adults, after being given a chance to investigate the issues. We wanted our students to know how to learn about such issues in order to become active, assertive members of our free society. We were determined to help our students become independent, autonomous learners. To help them take ownership of their learning, we had to teach them a new way to play school. They had to become equal partners with us in determining both the content and the process of their learning – within our guidelines, and meeting or exceeding the objectives for our class, of course.

To create this shared responsibility in these one semester, heterogeneous, untracked classes, we used Group Investigation. We had no idea that, by January, Alison, a second period sophomore, would be writing to President Bush about her brother Tom, who was serving in a Marine Division stationed in Saudi Arabia.

This six week unit was highly successful, only partially because it turned out to be so timely. Our students liked the unit, felt they had to work hard and think, and claimed to have learned significantly not only about the Middle East, but also about how to learn and how to work in groups. Their grades reflected their learning. They did well on tests related to the content, and perhaps more

importantly they did their work with commitment. They earned half as many D's and F's as students in non-teamed classes which did not use this cooperative learning method (Huhtala & Coughlin, 1991). We enjoyed the unit as well. It was a creative time; it brought us close together as we cooperatively planned and taught the unit, and it taught us about the Middle East – and about teaching.

Group Investigation can be used in many situations: long or short units, any subject, any grade level. It works best with subjects for which there is no simple answer and which require considerable research, because it provides a structure to harness the energy of a group to learn far more than any individual could alone. We found that the power of Group Investigation was multiplied, however, when linked to a political question. Because the method is designed to structure group work and decision making democratically, it is a perfect match for investigations of issues requiring decisions in a democracy.

Our students' most powerful and lasting lesson was not what they learned about the Middle East, although many said they felt they knew more than any adults they talked to. It was what they learned about learning. At first, many had simplistic reactions: "Just nuke them." Later, they began to feel they could not support any position: "How can I have an opinion? There's too much to know." Finally, they realized that no one ever knows all the answers, but that they were as informed as they could be in the time available. They were ready to make suggestions to public officials that were often quite sophisticated.

TRYING GROUP INVESTIGATION

We discovered that Group Investigation of our topic was very different than teacher-assigned group projects or group reports. We found it took all our combined efforts to plan, modify, adjust, and create this unit as we taught it. It took all of us to support and encourage each other. We now realize the enormity of the task we set ourselves and our students when we chose, shortly after Iraq invaded Kuwait, to ask students, "How can we achieve peace in the Middle East?" We planned the unit according to Sharan's stages (1990).

Stage one: Identify the topic and organize research groups

Our team of four English and four social studies teachers taught seven classes. We gave a pretest and discovered, not surprisingly for September of 1990, that our students knew very little about the region's politics, geography, or history. Our first task, then, was to motivate students to want to learn about the region and to provide some initial information to stimulate their interest. We had them read some general background articles from magazines and newspapers, gave a brief overview chapter to study, and brought in two speakers – a Palestinian and a Yemeni. We then had them complete a brief library research project on basic facts about the region as a cooperative activity. This was intended to teach them library skills and to enhance their cooperative skills as well as to teach them about the region.

They were now ready to plan their initial inquiry. We used various methods in our classes at this step, but a typical lesson involved students

brainstorming questions they had about the gulf crisis. These ranged from how much oil the United States imported from the region to how old Saddam Hussein was. Groups of students wrote their questions on butcher paper; these lists were then displayed around the room. Groups went from list to list reviewing, discarding, and ranking questions. The compiled list was then put on the overhead, and a classification lesson followed. As the students grouped similar questions, the teachers checked to see that no significant topics were being overlooked. Finally, six or seven major topics emerged, and students created labels for the groupings.

At this point, two different strategies were used by the teacher teams. Some allowed students to chose their topics individually. Others formed study groups based on student requests – and teacher judgment – and asked each group to make a choice of topic, with second choices in case of overlap.

Stage Two: Plan the investigation

Once formed, student study teams began the task of formulating their inquiry. This involved stating their topic as a question to be researched, and then dividing it into subtopics to be investigated by individuals or pairs within the team. This is a cognitively demanding task that requires thinking and social skills, and considerable time. Some plans had to be changed more than once.

Final plans were posted on a bulletin board. It was visually obvious how each individual's topic related to their group's question, and how that question was linked to the class inquiry. For example, Steve's topic was, "How did oil prices influence Saddam Hussein's actions before and during the crisis?" This

supported his group's question, "What impact does oil have on the Middle East crisis?" The answer to this larger question was necessary to answer the class' problem of how to achieve peace.

Stage three: Investigating

This stage of the unit took place during the next three to four weeks, while other parts of the curriculum also were covered in class. Students spent time in the library, interviewed people out of class, or watched the news. They brought in newspaper and magazine articles to share with each other. They often found they had to redefine or completely change their individual questions. When they completed their investigation, they produced individual papers on their findings both for a grade and to share with their study teams.

Stage four: Preparing a report

These reports prepared by the study teams were more than cut and paste summaries of the individual papers, although some started out as such. Students were encouraged to work together to draw inferences from their individual findings that had bearing on their team's question. As they did so, their report took shape, and became a group paper, summarizing their findings and suggesting implications whose significance exceeded the sum of their parts (G. Wells, G. Chang, & A. Maher, 1990). These group papers were collated and duplicated so that each class member had a copy to use to study for the test and to use as a

reference for the final writing assignment: a letter to some person or organization with political influence related to the crisis.

Stage five: The final presentation

As the teams completed their work, a Steering Committee was convened, formed of one representative of each team. This committee planned how to present the most significant team findings to the class in an interesting and creative fashion. Some teams used skits, others made videos, while others designed charts and maps, or presented cooperative learning lessons based on the "Jigsaw" method devised by Elliot Aronson (1978). One class chose to have a local newspaper columnist come in to conduct a "town hall" discussion on the gulf, based on a local television station's audience discussion program. By coincidence, the station ran a discussion program on the gulf during our unit, so a dozen of those students were able to attend the taping – one was able to participate.

The Steering Committee group proved to be indispensable. We erred in some classes by not supervising the selection of representatives; our sophomores "elected" male representatives from every group. Even so, the group worked well. Not only did they plan and organize the final presentations, they also helped plan and organize the ongoing investigation. They facilitated the sharing of information between teams, they negotiated with the teachers for revised deadlines, and they helped each other problem-solve difficulties in interpersonal relationships within teams. As in any organization, some conflicts occurred. Some students, for example, felt they were the only ones in their group who could do

good work; others felt they were not treated with respect by another group member. They were encouraged to talk to each other to work out their problems, as no one individual could possibly complete the team task alone. Tim, for example, initially thought he would have to finish his group's report himself, but with some advice decided to have his group meet over the weekend so they could all contribute to the presentation. The Steering Committee provided a support group for sharing these problems.

This representative body served the dual role of modeling democratic institutions and creating the vehicle for students to take ownership of the learning process. There was a noticeable shift in motivation some time in the first week, in the library, when students began to realize that the teachers did not have any simple answers, that there was no answer key, and that problems did not have clean, simple shapes. They first expressed some understandable frustration, and then began to accept responsibility for defining their tasks and for accomplishing them. Much of the processing needed to create this crucial transition took place in ad hoc meetings of the Steering Committee.

Stage six: Testing and evaluation

There were many measures of student performance in this unit. One of the most useful was the fact that each teacher was able to monitor students closely by serving as a guide and coach rather than a whole class lecturer. Students took a post test as well as a pretest. They wrote individual reports, group implication papers, and individual letters to politicians or the media. They created team

presentations for the class, as well as completing a variety of daily assignments and keeping individual journals.

The final exam for this unit included a teacher-designed post test, but students also designed an exam. As Sharan suggested (1990), we had each study team write two questions on their topic for an essay exam. In a typical class this would total 14 questions for the exam, 12 to be answered by each student. The study teams then graded the questions they wrote. This procedure provided useful review for the students, and additional ownership of the unit. Unfortunately, we did not provide enough time for the teams to develop grading rubrics, so we had to regrade the tests for consistency.

We often asked for informal feedback, in the form of "letters" to their teachers or "exit slips". When the unit was completed, we asked for attitudinal feedback by having students write letters of advice to the next class to undertake a Group Investigation unit. One of Mary's comments was, " The good part about working in a group is that you can all teach each other things and you make each other work hard." Nick wrote, "I learned that the harder I worked the more I learned, and the more I learned, the more interesting it became." Some of these statements were among our most powerful and most treasured endorsements: "The teachers weren't really teachers. They were there to help us out, but we did most of the learning ourselves".

We also compared grades in these classes with grades of students in non-teamed classes. The results were dramatic. Absenteeism was reduced by a third. D and F grades were reduced from 20% to 13%. The percentage of students failing these required classes was cut in half, from 10% to 5%.

EXTENDING GROUP INVESTIGATION

After our initial experience with Group Investigation and the Gulf War, we made such a unit a standard part of the sophomore interdisciplinary curriculum. Each year's topic was new, including units on wetlands and land use planning, the homeless, and community planning. We learned to be comfortable with the mechanics of implementing the method, and experimented with slight variations in the process. We gradually became aware of some weaknesses in the way we structured these units and began to look for ways to improve them.

In January, 1994, our interdisciplinary team tried what was for us our most ambitious teaching configuration. Biology teachers joined the English and Government teachers in offering a three course block. Classes remained together for all three disciplines, and counselors were also assigned to each team. Three teams of four teachers taught eight sections of sophomores, approximately 250 students. The curriculum was organized around themes, such as Homelessness, The American Dream, Race and Gender, or Water and Salmon. Each theme allowed the disciplines to contribute to the study, often in ways that blurred disciplinary boundaries and had class activities overlapping periods. For example, students read and wrote short stories and poems about homelessness, debated the costs and benefits of low income housing, interviewed the director of a school for street kids, and discovered health problems commonly afflicting the homeless. Class projects for the various themes included production of a magazine on Teenage Homelessness involving all eight class sections, contributions to a local data base on stream quality, and an analytical paper linking the play *Raisin in the Sun* with concepts from Biology and Government.

Group Investigation of Rich and Poor Nations

While these units all used some variety of cooperative learning, we did not use a complete Group Investigation approach until the last unit, on Rich and Poor Nations. The topic was international, although it lacked the topicality of the Gulf War unit. Student teams studied from one to four developing nations through the lens of one aspect of national policy such as education or health care. Their task was to determine what the American response should be to the needs of their nations in the policy area they selected. Students presented their findings in panel discussions, skits, town hall debates, or other formats, accompanied by visual aids, including graphs and charts produced by relatively sophisticated computer programs. The mechanics of this Group Investigation unit, while somewhat more sophisticated, were in essential details similar to the first Gulf War unit we had taught. The content, however, covered three disciplines, increasing the complexity of the task for both students and teachers. Our assessment of the results of the unit were mixed, and pointed us toward specific areas needing attention.

Student Outcomes

Students were positive in their assessment of the unit, citing increased global awareness and understanding the complexity of the issues as key learnings. In surveys administered to the entire group of sophomores in the program, we received generally positive comments. Some answers were almost

predictable. For example, one of the things students generally liked about the Core Team, as we called our integrated program, was that they got to stay with and get to know the same group of students. On the other hand, being typical sophomores, one of their complaints was that they had to stay with the same group of students. Virtually all recognized the power of cooperative groups, however. As one student wrote, "Being in the Core was like being on a team; if one player hasn't done his job, it affects everyone in his group."

Most felt that their grades were about the same as in previous classes, but that the work was harder. They were able to maintain their grades partially because the connections between disciplines made sense to them. As one student stated, "Being able to see the connections in the classes has helped a lot because before I always wondered, 'When are we ever going to use this?' The Core classes show you how to associate things together."

Teacher Assessment

Teachers also noted some significant positive outcomes from this unit. We expanded our instruction in such cognitive processes as summarizing, drawing inferences from data sets, and analyzing a problem. We added another dimension of complexity to the tasks students faced by incorporating the perspectives of three different disciplines. This did have the desired effect of increasing students' sense of connections between disciplines, although we found that we had to ask students to make such links – relatively few saw such connections independently.

We also, however, saw significant difficulties with this unit. One key problem was that our school's science program was tracked into biology (low) and chemistry (high) strands. Therefore our students, who were all in biology, were typically average or below in aptitude and commitment to studying science. This lack of heterogeneity meant the classes lacked role models for behavior, academic achievement, and leadership (D. Johnson & R. Johnson, 1985b). These classes also did not have a rich set of different reasoning strategies, cognitive perspectives, information, or abilities to draw on in cooperative learning activities (D. Johnson & R. Johnson, 1985a).

IMPLICATIONS: NEXT STEPS TO PROBLEM-BASED GROUP INVESTIGATION

Our experience has been that Group Investigation is a powerful methodology in general, especially well suited for interdisciplinary studies. While we have learned much about the mechanics of planning and implementing these units, including the not at all trivial issue of coordinating the work of a dozen teachers on a daily basis, we can see obvious need for revision. Our plans for 1994-1995 address these concerns. We will offer Integrated Science to 9th and 10th graders in these Core programs, thus ensuring heterogeneous classes, involving 35 teachers. We will start the Group Investigation earlier, to capitalize on the benefits to be gained from students who have matured as learners. We will make more use of technology for students to gather information and to prepare presentations.

A key reform will be in the selection and structuring of the topics for investigation. We had discovered some unanticipated but significant implications of the study. Our second experience with an interdisciplinary Group Investigation in the sophomore class caused us to reflect on the reasons for what we perceived to be only qualified success. As previously noted, the de facto tracking of the classes was a significant problem, and one that we resoved to correct.

We also noted that these students' behavior, motivation, maturity, and cooperation with each other increased during this unit, which led us to believe we should have placed the unit earlier in the term so that classes could have built on the positive group effects of the Group Investigation experience (N. Graves & T. Graves, 1985). We also believe, after analyzing the presentations and papers from students in this unit, that the topic was too broad and too abstract. While many of the student products were creative and quite polished, they frequently displayed only a superficial understanding of the issues studied.

On further reflection, we began to feel that the problem with the student products was in the structuring of the inquiry itself. Specifically, we felt that the issues we presented to our students were not specific enough, or local enough, or meaningful enough, or engaging enough. We needed to find some way to sharpen the presentation of the problem posed for the Group Investigation and also to motivate more meaningful final products. To some degree, we had anticipated the superficial products our students presented. In planning the unit, we had considered and rejected several problems that might have led to more concrete investigation and therefore to more thorough products, including units on the Northern Spotted Owl, Salmon fisheries, or logging practices. We rejected

these ideas partly because they are highly charged emotionally and also politically volatile in the Northwest – both conditions arguably also in favor of using them. We also, however, felt we wanted a topic broad enough to catch all the content of three disciplines. In retrospect, we might very well have dealt with as much or more content by going deeply into a narrow issue rather than by staying so broad. We had also considered a variety of final products, including simulations of government decision making, exhibitions prepared for the larger school community, and various ways to share knowledge between classes. We were unable to reach a consensus on a final product, however, and settled for smaller scale presentations.

As a result of these reflections, we had determined that we wanted topics for 1994-1995 that would be concrete enough to investigate thoroughly, that would, in fact, be emotionally charged, and that would lead to a polished final product. Our consensus opinion is that for students to understand an issue as a real concern, and to understand how to create an informed opinion on a complex problem, they need to grasp it deeply. This implies selecting an issue which is concrete, narrow enough for students to grasp its important details, but complex enough to lack obvious solutions. The issue for study should have ethical as well as technical dilemmas so that its need for action includes an emotional urgency. If it would be possible to select local issues, access to primary source materials and people would be easier.

We had some sense of what this solution would look like. Our science department, for example, in developing what is to become an integrated science curriculum for grades 9 and 10, had built several problem-based units. One example is their car crash unit, integrating the scientific disciplines in the problem

of reconstructing the events leading to a crash. We had also studied various public issue based curriculums over the years, from national speech topics to Canadian curriculums.

This perceived need led us to consider Problem-Based Learning (Stepien, 1993) as a tool to focus our selection of topics more concretely, to structure a richer learning situation, and to refine our methods of assessment. We decided to invite Stepien to work with us in adapting the techniques developed at the Center for Problem-Based Learning and the Illinois Mathematics and Science Academy. He met with us to introduce the method, and we experimented with it in the spring of 1994. One of sample units he presented was on the Northern Spotted Owl, which we had decided earlier not to pursue. In it, students are asked to develop a plan, which they can defend both scientifically and ethically, to permit the removal of the owl from the list of threatened species, ensuring that it will not become extinct. While we may still decide not to use this particular unit, it illustrates the possibilities for student involvement with many levels of investigating and problem-solving. The techniques of Problem-Based Learning provide solutions to many of the needs we had noted in our analysis of our Group Investigation unit, and should facilitate a powerful marriage of two complex and effective classroom teaching technologies.

We plan to incorporate Problem-based Learning into our Core programs in the fall of 1994. Our Group Investigation units will combine the insights of Problem-based Learning in selecting topics and in structuring student educational outcomes and student products, with the power of Group Investigation to organize a classroom into an integrated group of groups.

A final key finding from our experience — which was also unanticipated — has been the importance of the congruence between the social organization of the classroom and the governance organization of the school. What we have found can be stated at two levels of generality. At the most concrete level, teachers involved in cooperative work practices are more likely to be successful in implementing cooperative learning activities in their classrooms. Our teachers worked on teams to research and develop their Group Investigation units. By the spring of 1994, our building was cooperative on many significant levels. Departments collaborated on the budgeting process, pooling resources for needed capital items and setting building budget priorities together. A Site Council, composed of the principal, a parent, a classified employee, and a majority of teachers, administered the expenditures from an Oregon State Department of Education grant. The Site Council was organized into cluster committees, which brought proposals for curriculum work, staff development opportunities, and restructured school organization and curriculum to the Council. This representative organization involved about half the staff directly. It is also a structure directly congruent to the Steering Committees used in our Group Investigation units.

Because teachers had worked together in cooperative structures for curriculum and governance purposes, they were better able to teach cooperative practices to their students and they valued cooperative learning more highly. We had deeper understanding, caring, and trust towards one another; we were more willing to risk experimenting with instructional practices; and we had higher expectations for student motivation and success.

At a more abstract level of generality, our experience indicates that the adoption of an innovation is more likely to be successful to the extent that it is congruent with the climate and culture of the building to which it is being introduced. In our case, Problem-Based Learning is a perfect match not only because it fits so well with Group Investigation, but also because it fits our climate of and structures for Site Based Decision Making. The Site Council's charge, to increase student success, is essentially a very large problem-solving task. Both Group Investigation and Problem-Based Learning were selected by teachers as needed innovations and proposed for staff development projects. Our building administration was both knowledgeable and supportive of the initiatives. Problem-Based Learning is being well-received because of its congruence with existing curriculum and instruction, and, more deeply, with the governance structure of the building.

Group Investigation is only one of several interventions our building has implemented in the past several years as we have attempted to ensure success for all students. It has brought deep and lasting change to our classrooms, but was never conceived of as solution for all times. It was inevitable that we would see it evolve, as we now are watching it incorporate elements of Problem-based Learning. Our expectations are that our new Problem-based Group Investigation units will be more effective than our previous efforts, that we will need some experience before we learn how best to implement this new methodology, and that it, too, will eventually be modified. Continued experience with and reflection on these methods, I am convinced, can increase both the excitement and the rigor of secondary education.

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